

Crustacea.

I., pp. 1-24.	1833.	} Wieg. Arch. 1842 (ii.), p. 317, note, and 1835 (i.), p. 5.
II., " 25-64.	1835.	
III., " 65-72.	1837.	
IV., " 73-108.	1839.	
V., " 109-164.	1841.	} See signatures 7, 17, 19, 28, 42 & 50, and Wieg. Arch. 1851 (ii.), p. 393.
VI., " 165-196.	1849.	
VII., " 197-244.	1849.	

Commentatio, pp. vii-xvi, April 1850; Præfatio, pp. iii-xxxi, 1849.

4. On the Pyrenean Newt, *Molge aspera*, Dugès.

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(Plates V. & VI.)

Synonymy.

Hemitriton asper, *cinereus*, *rugosus*, *punctulatus*, *bibroni*, Dugès, "Recherches Zoologiques sur les Urodèles de France," Ann. des Sc. Nat. 3^e série, Zool. t. xvii. 1852, p. 253, pl. 1 B. figs. 1-3, 16-22.

Hemitriton asper, v. Bedriaga, "Beitr. z. Kenntniss d. Amphibien u. Reptilien d. Fauna v. Corsika," Arch. f. Naturgesch. xlix. Jahrg. 1 Bd., S. 124, Taf. iv. figs. 18-21, 23, 28, 31-37.

Triton pyreneus, *rugosus*, *cinereus*, *repandus*, *bibroni*, *punctulatus*, Duméril et Bibron, Erpétologie générale, t. ix. pp. 139, 150-154, Atlas, pl. 106. figs. 2, 3, pl. 102. fig. 4.

? *Euproctus rusconi*, part., Duméril et Bibron, *ibid.* p. 158.

Calotriton punctulatus, Gray, Proc. Zool. Soc. 1858, p. 139.

Triton platycephalus, part., Strauch, "Revision d. Salamandriden-Gattungen," Mém. Acad. Imp. Sc. de St. Pétersbourg, 7^e série, t. xvi.; Schreiber, Herpetologia Europæa, S. 54 (Braunschweig, 1875).

Euproctus pyreneus, Lataste, in Revue Internationale des Sciences, 1878, pp. 495, 496.

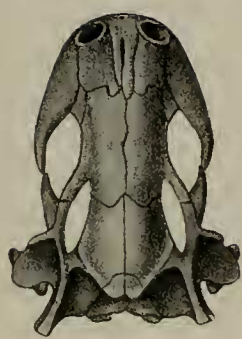
Molge aspera, Boulenger, Catalogue of the Batrachia Gradientia in the Collection of the British Museum, pp. 8, 24 (London 1882); v. Bedriaga, "Synopsis d. europ. Molge," Zoologischer Anzeiger, 1893, S. 214.

External Characters.

This species is allied to *Molge waltli*, having like it a very much developed cartilaginous internarial wall, a stout and clumsy body covered with rugous tubercular skin, free toes, and a crestless back. The head resembles that of the Italian *M. cristata* var. *platycephala*, but it is much more depressed; it is longer than broad, its greatest width at the posterior corners of the eyes. Snout rather







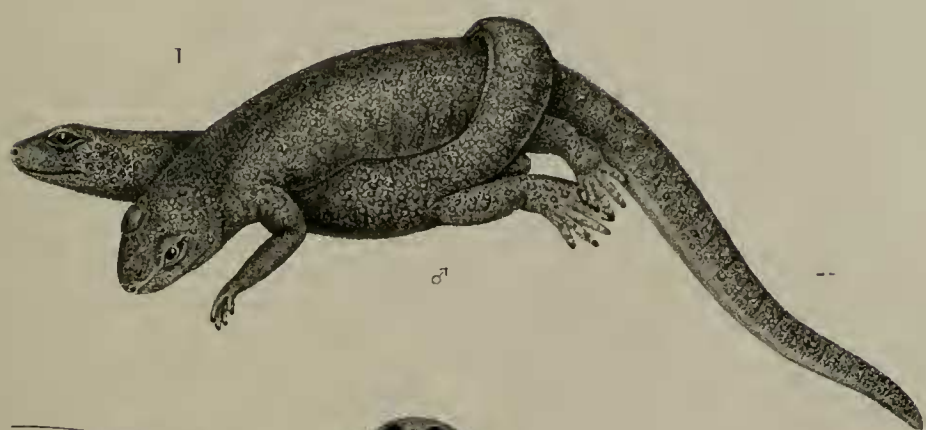
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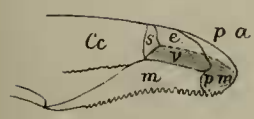
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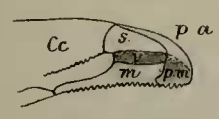
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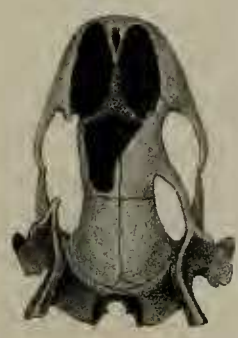
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4.



5



6.



7.



elongate, slightly narrowed, rounded, blunt or distinctly truncate, projecting beyond the mouth. Canthus rostralis more or less distinct. Eyes lateral, moderately large, prominent on the upper surface of the head, which is flattened; the distance between them is rather less than between the nostrils and distinctly less than the distance from the latter to the eyes. The diameter of the eye, or rather the distance between anterior and posterior corner of the eye, is less than that between the eye and the nostril. The upper eyelid is narrower than the interpalpebral space. Nostrils rather large, close to the border of the snout, lateral, pierced just below the canthus rostralis, and therefore rather distant from the lip, though nearer to it than the eyes. Labial lobes well developed during the breeding-season, especially in males. Cleft of the mouth extending beyond the posterior corner of the eye. Tongue small, elliptical, slightly free along the sides. Palatine teeth in two slightly curved series, commencing on a line with the choanæ and in contact anteriorly, diverging gradually backwards and forming almost a Λ -shaped figure. Gular fold distinct. No parotoids.

Body stout, rounded or depressed (var. *rugosa*), longer in females than in males; no dorsal crest; longitudinal dorsal groove present or absent. Limbs moderate, clumsy; hind limbs stronger in the male, with a hardly visible fibulo-tarsal dilatation, when carried forwards along the body reaching to the middle of the space between hind and fore limbs or extending a little beyond; in females the hind limbs are always shorter than the above-mentioned length. Fore limbs, when brought forwards, reaching the anterior corner of the eye or slightly beyond, the latter being especially the case in females. Fingers and toes free, depressed and rather short: the fingers are somewhat longer and thinner in the female.

Anal lips forming in the male a nearly semiglobulous prominence like that of *M. cristata*, but with a longitudinal cleft not extending so far anteriorly, but occupying only the posterior half of the anal prominence. After the breeding-season the anal prominence sometimes assumes, especially in specimens from the Lac de Gaube, the shape of an obtuse cone. In females the anal prominence is pear-shaped or conical, with a short longitudinal cleft turned quite backwards; this cleft does not extend over the lower surface of the anal prominence. During the pairing and oviposition the summit of the cone is slightly directed downwards, but never to that extent which is the case in specimens preserved in alcohol; this cone has in living specimens never the length which it acquires as soon as the newt is put into spirit of wine.

Tail thick and rounded at the base, then becoming gradually compressed, ending in a more or less obtuse point, sharp-edged or keeled above in its posterior part: beneath, a more or less sharp edge is seen sometimes only at the very end of the tail. The tail is low and as long as head and body or longer in the female; higher, thicker, and shorter than head and body in the male. In the former the length of the hind limb is generally contained thrice in

the length of the tail; in the latter the hind limb measures a little less.

Upper surface generally minutely granulate, with numerous linear grooves and more or less distinct and more or less numerous warts furnished with a dark granular, conical or spine-shaped horny tubercle. These warts are mostly developed along the sides of the body and head, along the limbs and on the tail; they are also very frequent on the upper part of the head and on the back, rather seldom and scarce on the abdomen and on the lower surface of the limbs. In specimens from Lake Gaube, which I consider to belong to var. *rugosa*, the skin is roughly tuberculous, especially on the base of the tail; the warts are here decidedly conical with spiny tubercles. Very seldom, and, as it seems, only in females during the breeding-season, the skin appears nearly smooth. No distinct carpal or tarsal tubercles.

Coloration. (Plate V. figs. 1, 2, 3, 5.)

The upper parts are greyish, brownish grey, or olive-grey, uniform or with yellow or yellowish spots. The shade varies in the course of the year and in different individuals at the same period: however, the colours get merely darker or lighter, and the predominant one seems to be as a rule grey, varying from the lightest ash-grey to blackish grey. The yellow-spotted individuals are less abundant than the uniform ones, and the bright lemon-yellow spots are seldom seen in adults; the yellow is generally very pale or intermixed with grey. These spots are very variable in size, shape, and disposition; they are either small, round, indistinct and scattered along the sides of the body, or larger, irregular, and disposed quite asymmetrically on the back; very often they are more or less confluent and form a broad vertebral band, which appears sometimes interrupted in different places. In cases when it is absent, the median dorsal line is mostly marked, being generally of a light brownish tint. The yellow spots on the tail are frequently much more marked than those over the body; they are round or rhomboidal, and placed along the upper portion of the tail, or confluent with a yellow band or yellow line which extends over the middle of the tail. This line is nearly always present even in the uniformly blackish specimens, though it is rather seldom of a light and bright colour, but brownish yellow. The dark granules which crown the warts and the spine-shaped tubercles are more distinct in lighter individuals, and especially on the sides of the head, body, and tail, where they are surrounded by a yellowish circle or even placed on yellowish or whitish warts. These light warts may appear in great number on the sides of the body and on the lower portion of the tail; the limbs also possess some. Towards the lower part of the sides of the body, as well as on the sides of the belly, the greyish ground is generally powdered with yellow and spotted with small round or angular and irregularly shaped dark spots: these spots seem never to be absent along the border

of the dark area of the sides of the belly, and are partly placed on the grey ground-colour and partly on the bright-coloured median area of the belly. The latter varies in its width; it is pale yellow, yellow with or without traces of orange and pink, orange or red. Generally the whole middle portion of this area is entirely immaculate; sometimes with very few spots, and these distinct, wide apart, scattered, and entirely dark round ones, just as if they had been accidentally misplaced. The throat is immaculate or indistinctly dotted with grey; its ground-colour is similar to that of the belly, but it has never the same rich tint, sometimes so beautiful; the lower edge of the tail on the contrary may be even more brightly coloured than the belly. When collecting these newts, I was quite struck by an orange or red line underneath the tail which the animal seemed intentionally to exhibit, and which looked just like the antenna of a boiled crawfish. The anal prominence appears also often orange or reddish, and these colours can extend over the lower surface of the limbs. The inner fingers and toes are always lighter than the outer ones and as a rule yellowish; palms and soles are yellowish or partly yellow and partly, on their external portion, grey. The transverse dark stripes on the fingers and toes are more or less distinct. The tips of the fingers and toes are generally dark.

Pupil oval, with a pale gold margin interrupted below in the middle. Iris pale golden, strongly spotted with light and dark brown.

Variation in Colour.

The ground-colour and the markings vary to a certain extent in *M. aspera*, but these variations are mostly either merely individual or due to sexual selection. In other cases light and bright colours appear temporarily when the newt lives in water and disappear as soon as it goes on land. Different combinations of colours and shades as well as markings are also in so far temporary as they vanish with the growth of the newt. As regards the colours of the upper surfaces of the adult, both sexes are alike; the diverse modes of life affect them only to a certain extent, for we know that this species is brightly coloured in summer and that it gets a duller colouring in winter. The modifications of colours of the lower surfaces are doubtless connected with the sexual functions, and, strange to say, the greater brightness of colour is shown by the females, whilst in all other species we find in the female plain colours, whilst the males acquire a more intense and brilliant coloration.

As a rule the colours of both sexes are alike in the young, but the older the newts get the more the colouring of their lower surfaces is differentiated. The young ones are generally light grey and more or less spotted with yellow or striped; their belly is pale orange. With the growth of the individual appears a tendency to deeper and more intense colouring of its upper surfaces, and the yellow markings very often disappear altogether or become

comparatively indistinct, whilst the lower surfaces generally turn paler in the male and retain the primitive tint in the female, or acquire in the latter more and more intensity.

The sexual difference in the colour of the belly, throat, and edge of the tail is almost constant, although it is not so striking during the terrestrial existence of this newt.

Var. *rugosa*.

My friend Mr. G. A. Boulenger refers *Hemitriton* vel *Triton cinereus*, *rugosus*, *bibroni*, *puncticulatus*, Dugès, Duméril & Bibron, *Hemitriton asper*, Dugès, *Triton repandus* and *Tr. pyrenæus*, Duméril & Bibron, to the synonymy of *Molge aspera*, and in fact the descriptions given by the French authors are so superficial and unsatisfactory that they lead merely to confusion. Besides, the above-named authors were neither well informed about the localities in which their indifferently preserved specimens were captured, nor did they take the trouble to discriminate the sexes. Mr. Boulenger was therefore perfectly right in referring all those numerous species to *M. aspera*, Dugès. Nevertheless one of them, the *Hemitriton* or *Triton rugosus*, may be considered as a variety. At least I believe that the specimens of *M. aspera* which I collected in the Lac de Gaube and in the river Gave are different to a certain extent from those I found in the Lac d'Oncet. Those lakes (and the same may be said of the greater number of lakes in the Pyrenean mountains) are perfectly isolated one from the other, and it is therefore hardly possible that the newts of one of the lakes ever mix with those of the neighbourhood.

The principal characters of the rugous variety of *M. aspera* are as follows:—

The physiognomy and coloration resemble those of *M. waltli*. Total length 150 mm. This newt is therefore somewhat larger than the type. Head large and much depressed; snout distinctly truncate. Skin strongly tuberculate above, especially along the sides of the head, body, and tail, where regular spines are to be found. The upper surfaces are light or dirty grey with a more or less pronounced brown tint, spotted with dark olive-brown or blackish. These spots are (especially when small and round) very distinct upon the lower parts of the sides of the body and towards the belly. In individuals with yellow markings on the back and tail these spots concentrate near the markings and generally form their dark margins. The above-mentioned warts are yellowish or dirty white, with dark horny granules or spines in the middle. The tail seems to be always a little lighter than the body, mostly greyish with small dark spots and a brownish-yellow line along the upper caudal edge, which is very often interrupted by dark brown or blackish specks. Sometimes more or less confluent yellow spots appear on the upper part of the tail. Throat and median region of belly yellowish, with rather numerous small dark grey or blackish spots, especially towards the posterior part

of the belly in the male, or orange without or with very few blackish round spots. Lower edge of the tail yellowish in the male, orange or reddish in the female.

Measurements (typical form).

	♂. millim.	♀. millim.
Total length	113	128
Length of head	18	16
Breadth of head	13	11
From end of snout to anus	61	61
Length of tail	52	67
Depth of tail	7	6
Fore limb	18	17 $\frac{3}{4}$
Hind limb	19	18

Sexual Characters.

Male.—Tail shorter than head and body. Cloacal lips grey, strongly swollen and forming a subglobulous prominence; the longitudinal cleft extending over its posterior part¹. Belly with a narrow yellow, rarely orange median zone, generally spotted with black or dark grey, especially on the hinder portion.

Female.—Tail as long or longer than head and body. Anal prominence orange, conical or pear-shaped, much produced, directed backwards, with a short longitudinal or rather vertical cleft on the summit of the cone, looking entirely backwards. Belly with a wide orange or reddish median area, which is generally immaculate.

Osteological Characters.

The two series of palatine teeth commence on a line with the choanæ (Plate VI. fig. 3).

The fronto-temporal arch is bony (fig. 2).

The quadrate projects sideways and looks at the same time rather backwards than forwards.

The crista ossis vomero-palatini is hardly developed.

The septum nasi is formed by a single cartilaginous plate. [In all European newts with the exception of *Molge aspera* and *M. waltli* there is an almost entirely osseous and double septum nasi with but a small terminal cartilaginous portion, which separates it from the cartilaginous ethmoidal plate. It is formed by the well-developed ascending process of the premaxillary and the crests of the vomero-palatines which rise vertically. The almost wholly unossified septum nasi of *M. aspera* resembles that of *M. waltli*. It is merely a single, well-developed, thickish, cartilaginous wall, which extends beyond the opening between the vomero-palatines for the duct of the so-called "intermaxillary gland" and keeps the nasal cavities

¹ The anal prominence appears sometimes in the males of the rugous variety very obtusely conical in winter.

apart. Its posterior portion is grafted on the substance of the lamina cribrosa, anteriorly it meets the short inner vertical portion of the processus ascendentes of the premaxillary. The sectional view of the anterior part of the skull (Plate VI. fig. 5) and the upper view of the partly dissected skull (fig. 6) show the curious structure of the nasal cavity of *M. aspera*. I append two other views—fig. 4 and fig. 7—of the skull of *M. rusconi*, for the purpose of exhibiting the difference in the structure of the nasal cavity. *M. rusconi* possesses a strong double and ossified septum nasi.]

Larva. (Plate V. figs. 4 & 6.)

The head is rather large, longer than broad, and more or less distinct from the neck; the upper surface is flat. The snout is slightly depressed and rounded; it is always longer, narrower, and lower in females than in males. Nostrils very near the border of the snout; the distance between the nostril and the lip somewhat less than one-fifth of the distance between the nostril and the eye; the internarial space is a little broader than the interpalpebral breadth. Eye moderate, oval, lateral, moderately prominent; its distance from the nostril equalling (♂) or exceeding (♀) the interpalpebral width, and its distance from the lip is considerably greater than the vertical diameter of the eye. The longitudinal diameter of the eye is shorter than its distance from the nostril and also shorter than the internarial width, the breadth of the upper eyelid slightly exceeding the half of the interorbital space. The pupil is round. The cleft of the mouth extends to the vertical of the posterior angles of the eyes. Labial lobes moderately developed. The space between the longest gills is considerably longer than the upper part of the arm.

Body robust, rather short, and nearly round in males; more slender, moderately elongate, with flattened lower surface, in females. The distance between fore and hind limb is at least twice as great as the width of the head. Caudal crest extending but very slightly upon the back; it occupies hardly one-third the length of the body. Longitudinal groove along the sides very indistinct; eleven or thirteen costal grooves between axilla and groin, ten transverse grooves upon the belly. Anal region in young specimens hardly swollen. The limbs, especially the hind ones, are short and thick in the male, a little thinner in the female; the fore limb when stretched forwards reaching the anterior corner of the eye in the male, or slightly beyond in the female; the hind limb being carried forwards equals the half of the length of the distance between fore and hind limbs. Fingers and toes short, rather thick, ending in a point; the third finger longer than the second, which is longer than the fourth and first; the first is somewhat shorter than the fourth; the middle toe is the longest, the fourth toe is longer than the second, which is in its turn much longer than the first and fifth; the latter is a little longer than the first. The tips are blackish brown. Tail measuring about the